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| 10/603,273      | 06/25/2003  | Peter Brandt         | 31021037 US-01      | 4469             |

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| EXAMINER |
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DWIVEDI, MAHESH H

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| ART UNIT | PAPER NUMBER |
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2168

| SHORTENED STATUTORY PERIOD OF RESPONSE | MAIL DATE  | DELIVERY MODE |
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| 3 MONTHS                               | 04/05/2007 | PAPER         |

**Please find below and/or attached an Office communication concerning this application or proceeding.**

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

|                              |                        |                     |  |
|------------------------------|------------------------|---------------------|--|
| <b>Office Action Summary</b> | <b>Application No.</b> | <b>Applicant(s)</b> |  |
|                              | 10/603,273             | BRANDT, PETER       |  |
|                              | <b>Examiner</b>        | <b>Art Unit</b>     |  |
|                              | Mahesh H. Dwivedi      | 2168                |  |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

- 1) ☒ Responsive to communication(s) filed on 26 December 2006.
- 2a) ☐ This action is **FINAL**.                      2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

- 4) ☒ Claim(s) 16-29 and 31-37 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 16-29 and 31-37 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

**Application Papers**

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 11/28/2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

**Priority under 35 U.S.C. § 119**

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All    b) ☐ Some \*    c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

**Attachment(s)**

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

## DETAILED ACTION

### *Continued Examination Under 37 CFR 1.114*

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 09/08/2006 has been entered.

### *Remarks*

2. Receipt of Applicant's Amendment, filed on 12/26/2006, is acknowledged. The amended parts includes the amending of claims 16-17, 21, 23, 26, and 29, the cancellation of claims 1-15, and 20, the addition of claims 31-37.

### *Claim Objections*

3. Claim 32 is objected to because of the following informalities: The phrase "controls said writing to **occure**" should be changed to "controls said writing to **occur**". Appropriate correction is required.

Claim 35 is objected to because of the following informalities: The phrase "The integrated circuit of claim 26" should be changed to "The integrated circuit **device** of claim 26". Appropriate correction is required.

### *Claim Rejections - 35 USC § 103*

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. Claims 16-24, 26-27, 29, and 31-37 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Boner** (U.S. Patent 6,625,763) in view of **Hemming** (U.S. PGPUB 2004/0168011).

6. Regarding claim 16 **Boner** teaches a method comprising:

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- B) inputting a stream of data entities into a shift register (Column 6, lines 24-38),
- C) writing said data entities successively from said shift register into a memory, until all memories are completely filled or until all data entities are written (Column 6, lines 39-51, Figures 5-11);
- D) performing selection and permutation on said memories (Column 8, lines 23-33, lines 35-39), and
- E) Reading out said data entities in said permuted memories, in a memory-by-memory fashion (Column 8, lines 23-33, Figures 3-11).

The examiner notes that **Boner** teaches “**inputting a stream of data entities into a shift register**” as “Block interleaver 300 operates as follows. The first sixteen data values  $D_0$ -  $D_{15}$  are written to register file 301 in column order. Thus, during a first 4-bit write operation, the first four data values  $D_0$ -  $D_3$  are written to memory cells  $M_0$ ,  $M_4$ ,  $M_8$  and  $M_{12}$ , respectively, through the first ports (P1) of these memory cells. This pattern continues, with the next four data values  $D_4$ -  $D_7$  being written through the first ports of memory cells  $M_1$ ,  $M_5$ ,  $M_9$  and  $M_{13}$ , respectively, during a second 4-bit write operation. The next four data values  $D_8$ -  $D_{11}$  are then written through the first ports of memory cells  $M_2$ ,  $M_6$ ,  $M_{10}$  and  $M_{14}$ , respectively, during a third 4-bit write operation. The next four data values  $D_{12}$ -  $D_{15}$  are then written through the first ports of memory cells  $M_3$ ,  $M_7$ ,  $M_{11}$  and  $M_{15}$ , respectively, during a fourth 4-bit write operation. Four 4-bit write operations must therefore be performed to fill register file 301 as illustrated in FIG. 3” (Column 6, lines 24-38). The examiner further notes that **Boner** teaches “**writing said data entities successively from said shift register into a memory, until all memories are completely filled or until all data entities are written**” as “After register file 301 has been filled, the 4-bit values stored in rows R0, R1, R2 and R3 of register file 301 are transferred to rows R0, R8, R16 and R24, respectively, of RAM 200. This process requires four 4-bit read operations from register file 301 and four 4-bit write operations to RAM 200. The four write operations to RAM 200 are staggered by eight rows, thereby promoting the separation of consecutive data bits within the interleaved data stream” (Column 6, lines 39-46). The examiner further notes that **Boner** teaches “**performing selection and permutation on said memories**” as “permutations in the column order

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can be accommodated, by changing the manner in which data is transferred from register file 301 to Ram 200" (Column 8, lines 23-26) and "register file 301 can be implemented as a single-port RAM that can be written in column order" (Column 8, lines 35-39). The examiner further notes that the register file of **Boner** is a form of memory, and permutations are performed on the register file.

**Boner** does not explicitly teach:

A) providing a number of memories equal to the maximum number of columns in the interleaving function.

**Hemming**, however, teaches "**providing a number of memories equal to the maximum number of columns in the interleaving function**" as "the interleaver comprises four RAM devices M1 to M4 and sixteen register memories to store sixteen data values or symbols B1-to B4, C1 to C4, D1 to D4, and E1 to E4" (Paragraph 29).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Hemming's** would have allowed **Boner's** to provide accessing memories linearly without requiring multiport memory devices with several reading ports, as noted by **Hemming** (Paragraph 14).

Regarding claim 17, **Boner** further teaches a method comprising:

A) the step of writing into a memory is applied when said shift register is filled (Column 6, lines 39-46).

The examiner notes that **Boner** teaches "**the step of writing into a memory is applied when said shift register is filled**" "After register file 301 has been filled, the 4-bit values stored in rows R0, R1, R2 and R3 of register file 301 are transferred to rows R0, R8, R16 and R24, respectively, of RAM 200. This process requires four 4-bit read operations from register file 301 and four 4-bit write operations to RAM 200. The four write operations to RAM 200 are staggered by eight rows, thereby promoting the separation of consecutive data bits within the interleaved data stream" (Column 6, lines 39-46).

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Regarding claim 18, **Boner** further teaches a method comprising:

A) wherein said data entities are logical ones and zeros (Column 5, lines 17-19, Figure 2).

The examiner notes that Boner teaches “**wherein said data entities are logical ones and zeros**” as “a 4 column by 32 row RAM 200, which stored sequential data bits D0-D127 in a column order” (Column 5, lines 17-19). The examiner further notes that it is common knowledge that “data bits” (Column 5, lines 18) are in binary form.

Regarding claim 19, **Boner** further teaches a method comprising:

A) wherein said data entities are multiple bit words (Column 2, lines 31-45, Column 3, lines 40-45, Figures 3-11).

The examiner notes that Boner teaches “**wherein said data entities are multiple bit words**” as “If the SRAM block interleaver is arranged so that each row stores one or more memory words” (Column 2, lines 35-36).

Regarding claim 20, **Boner** further teaches a method comprising:

A) wherein said data entities are three bit words (Column 2, lines 43-45).

The examiner notes that Boner teaches “**wherein said data entities are three bit words**” as “assuming a word length of 3 bits (a full row), the block interleaver will be written during four cycles” (Column 2, lines 43-45).

Regarding claim 21, **Boner** further teaches a method comprising:

A) wherein said register is arranged to store each multiple bit word at one location in said memories (Column 3, lines 48-59).

The examiner notes that Boner teaches “**wherein said register is arranged to store each multiple bit word at one location in said memories**” as “the data values are written to the interleaver RAM in a row order, which is selected to implement a permutation of a column order of the original data stream” (Column 3, lines 49-52).

Regarding claim 22, **Boner** further teaches a method comprising:

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A) wherein the number of columns used in the column interleaver function is changed on the fly, said number of columns not exceeding said maximum number of columns (Column 1, lines 54-60, Column 4, lines 14-19, lines 54-57).

The examiner notes that the interleaving function taught by **Boner** can be used for different bit sizes with accompanying columns.

Regarding claim 23 **Boner** teaches a module comprising:

B) a shift register that receives a stream of data entities (Column 6, lines 24-38); and

C) a controller that controls writing said data entities successively into a memory, until all memories are completely filled or until all data entities are written (Column 6, lines 39-51, Figures 5-11); and

D) selection and permutation on said memories (Column 8, lines 23-33, lines 35-39); and

E) reading out said data entities in said permuted memories, in a memory-by-memory fashion (Column 8, lines 23-33, Figures 3-11).

The examiner notes that **Boner** teaches "a shift register that receives a stream of data entities" as "Block interleaver 300 operates as follows. The first sixteen data values  $D_0$ -  $D_{15}$  are written to register file 301 in column order. Thus, during a first 4-bit write operation, the first four data values  $D_0$ -  $D_3$  are written to memory cells  $M_0$ ,  $M_4$ ,  $M_8$  and  $M_{12}$ , respectively, through the first ports (P1) of these memory cells. This pattern continues, with the next four data values  $D_4$ -  $D_7$  being written through the first ports of memory cells  $M_1$ ,  $M_5$ ,  $M_9$  and  $M_{13}$ , respectively, during a second 4-bit write operation. The next four data values  $D_8$ -  $D_{11}$  are then written through the first ports of memory cells  $M_2$ ,  $M_6$ ,  $M_{10}$  and  $M_{14}$ , respectively, during a third 4-bit write operation. The next four data values  $D_{12}$ -  $D_{15}$  are then written through the first ports of memory cells  $M_3$ ,  $M_7$ ,  $M_{11}$  and  $M_{15}$ , respectively, during a fourth 4-bit write operation. Four 4-bit write operations must therefore be performed to fill register file 301 as illustrated in FIG. 3" (Column 6, lines 24-38). The examiner further notes that **Boner** teaches "a controller that controls writing said data entities successively into a memory, until all memories are completely filled or until all data entities are written" as "After register file 301 has

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been filled, the 4-bit values stored in rows R0, R1, R2 and R3 of register file 301 are transferred to rows R0, R8, R16 and R24, respectively, of RAM 200. This process requires four 4-bit read operations from register file 301 and four 4-bit write operations to RAM 200. The four write operations to RAM 200 are staggered by eight rows, thereby promoting the separation of consecutive data bits within the interleaved data stream" (Column 6, lines 39-46). The examiner further notes that **Boner** teaches "**selection and permutation on said memories**" as "permutations in the column order can be accommodated, by changing the manner in which data is transferred from register file 301 to Ram 200" (Column 8, lines 23-26) and "register file 301 can be implemented as a single-port RAM that can be written in column order" (Column 8, lines 35-39). The examiner further notes that the register file of **Boner** is a form of memory, and permutations are performed on the register file.

**Boner** does not explicitly teach:

A) a number of memories equal to the maximum number of columns in a interleaving function.

**Hemming**, however, teaches "**a number of memories equal to the maximum number of columns in a interleaving function**" as "the interleaver comprises four RAM devices M1 to M4 and sixteen register memories to store sixteen data values or symbols B1-to B4, C1 to C4, D1 to D4, and E1 to E4" (Paragraph 29).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Hemming's** would have allowed **Boner's** to provide accessing memories linearly without requiring multiport memory devices with several reading ports, as noted by **Hemming** (Paragraph 14).

Regarding claim 24, **Boner** teaches a module comprising:

A) A communication system device (Column 1, lines 14-20).

Regarding claim 26 **Boner** teaches an integrated circuit device comprising:

B) a shift register that receives a stream of data entities (Column 6, lines 24-38); and



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C) a sub-circuit that controls writing said data entities successively from said shift register into a memory, until all memories are completely filled or until all data entities are written (Column 6, lines 39-51, Figures 5-11); and

D) selection and permutation on said memories (Column 8, lines 23-33, lines 35-39);  
and

E) reading out said data entities in said permuted memories, in a memory-by-memory fashion (Column 8, lines 23-33, Figures 3-11).

The examiner notes that **Boner** teaches “**a shift register that receives a stream of data entities**” as “Block interleaver 300 operates as follows. The first sixteen data values  $D_0$ -  $D_{15}$  are written to register file 301 in column order. Thus, during a first 4-bit write operation, the first four data values  $D_0$ -  $D_3$  are written to memory cells  $M_0$ ,  $M_4$ ,  $M_8$  and  $M_{12}$ , respectively, through the first ports (P1) of these memory cells. This pattern continues, with the next four data values  $D_4$ -  $D_7$  being written through the first ports of memory cells  $M_1$ ,  $M_5$ ,  $M_9$  and  $M_{13}$ , respectively, during a second 4-bit write operation. The next four data values  $D_8$ -  $D_{11}$  are then written through the first ports of memory cells  $M_2$ ,  $M_6$ ,  $M_{10}$  and  $M_{14}$ , respectively, during a third 4-bit write operation. The next four data values  $D_{12}$ -  $D_{15}$  are then written through the first ports of memory cells  $M_3$ ,  $M_7$ ,  $M_{11}$  and  $M_{15}$ , respectively, during a fourth 4-bit write operation. Four 4-bit write operations must therefore be performed to fill register file 301 as illustrated in FIG. 3” (Column 6, lines 24-38). The examiner further notes that **Boner** teaches “**a sub-circuit that controls writing said data entities successively from said shift register into a memory, until all memories are completely filled or until all data entities are written**” as “After register file 301 has been filled, the 4-bit values stored in rows R0, R1, R2 and R3 of register file 301 are transferred to rows R0, R8, R16 and R24, respectively, of RAM 200. This process requires four 4-bit read operations from register file 301 and four 4-bit write operations to RAM 200. The four write operations to RAM 200 are staggered by eight rows, thereby promoting the separation of consecutive data bits within the interleaved data stream” (Column 6, lines 39-46). The examiner further notes that **Boner** teaches “**selection and permutation on said memories**” as “permutations in the column order can be accommodated, by changing the manner in which data is

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transferred from register file 301 to Ram 200" (Column 8, lines 23-26) and "register file 301 can be implemented as a single-port RAM that can be written in column order" (Column 8, lines 35-39). The examiner further notes that the register file of **Boner** is a form of memory, and permutations are performed on the register file.

**Boner** does not explicitly teach:

A) a number of memories equal to the maximum number of columns in a interleaving function.

**Hemming**, however, teaches "**a number of memories equal to the maximum number of columns in a interleaving function**" as "the interleaver comprises four RAM devices M1 to M4 and sixteen register memories to store sixteen data values or symbols B1-to B4, C1 to C4, D1 to D4, and E1 to E4" (Paragraph 29).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Hemming's** would have allowed **Boner's** to provide accessing memories linearly without requiring multiport memory devices with several reading ports, as noted by **Hemming** (Paragraph 14).

Regarding claim 27, **Boner** teaches an integrated circuit comprising:

A) A communication system device (Column 1, lines 14-20).

Regarding claim 29 **Boner** teaches a column interleaver comprising:

B) a shift register that receives a stream of data entities (Column 6, lines 24-38); and

C) a module that controls (a) writing of said data entities from said shift register to said memories (Column 6, lines 39-51, Figures 5-11); and

D) column selection and permutation (Column 8, lines 23-33, lines 35-39).

The examiner notes that **Boner** teaches "**a shift register that receives a stream of data entities**" as "Block interleaver 300 operates as follows. The first sixteen data values  $D_0$ -  $D_{15}$  are written to register file 301 in column order. Thus, during a first 4-bit write operation, the first four data values  $D_0$ -  $D_3$  are written to memory cells  $M_0$ ,  $M_4$ ,  $M_8$  and  $M_{12}$ , respectively, through the first ports (P1) of these memory cells. This pattern

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continues, with the next four data values  $D_4$ -  $D_7$  being written through the first ports of memory cells  $M_1$ ,  $M_5$ ,  $M_9$  and  $M_{13}$ , respectively, during a second 4-bit write operation. The next four data values  $D_8$ -  $D_{11}$  are then written through the first ports of memory cells  $M_2$ ,  $M_6$ ,  $M_{10}$  and  $M_{14}$ , respectively, during a third 4-bit write operation. The next four data values  $D_{12}$ -  $D_{15}$  are then written through the first ports of memory cells  $M_3$ ,  $M_7$ ,  $M_{11}$  and  $M_{15}$ , respectively, during a fourth 4-bit write operation. Four 4-bit write operations must therefore be performed to fill register file 301 as illustrated in FIG. 3" (Column 6, lines 24-38). The examiner further notes that **Boner** teaches "**a module that controls (a) writing of said data entities from said shift register to said memories**" as "After register file 301 has been filled, the 4-bit values stored in rows R0, R1, R2 and R3 of register file 301 are transferred to rows R0, R8, R16 and R24, respectively, of RAM 200. This process requires four 4-bit read operations from register file 301 and four 4-bit write operations to RAM 200. The four write operations to RAM 200 are staggered by eight rows, thereby promoting the separation of consecutive data bits within the interleaved data stream" (Column 6, lines 39-46). The examiner further notes that **Boner** teaches "**column selection and permutation**" as "permutations in the column order can be accommodated, by changing the manner in which data is transferred from register file 301 to Ram 200" (Column 8, lines 23-26) and "register file 301 can be implemented as a single-port RAM that can be written in column order" (Column 8, lines 35-39).

**Boner** does not explicitly teach:

A) a number of memories equal to the maximum number of columns desired in the interleaver.

**Hemming**, however, teaches "**a number of memories equal to the maximum number of columns desired in the interleaver**" as "the interleaver comprises four RAM devices  $M_1$  to  $M_4$  and sixteen register memories to store sixteen data values or symbols  $B_1$ -to  $B_4$ ,  $C_1$  to  $C_4$ ,  $D_1$  to  $D_4$ , and  $E_1$  to  $E_4$ " (Paragraph 29).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Hemming's** would have allowed **Boner's** to provide accessing memories linearly

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without requiring multiport memory devices with several reading ports, as noted by **Hemming** (Paragraph 14).

Regarding claim 31, **Boner** further teaches a method comprising:

A) wherein said shift register is a parallel shift register (Column 44-48).

The examiner notes that **Boner** teaches “**wherein said shift register is a parallel shift register**” as “In another embodiment, register file 301 can be implemented using two or more register files working in parallel. In such an embodiment, while a first set of data values is written into one register file, a second set of data values is transferred from another register file into RAM 200” (Column 8, lines 44-49).

Regarding claim 32, **Boner** further teaches a module comprising:

A) wherein said controller controls said writing to occur when said shift register is filled (Column 6, lines 39-46).

The examiner notes that **Boner** teaches “**wherein said controller controls said writing to occur when said shift register is filled**” “After register file 301 has been filled, the 4-bit values stored in rows R0, R1, R2 and R3 of register file 301 are transferred to rows R0, R8, R16 and R24, respectively, of RAM 200. This process requires four 4-bit read operations from register file 301 and four 4-bit write operations to RAM 200. The four write operations to RAM 200 are staggered by eight rows, thereby promoting the separation of consecutive data bits within the interleaved data stream” (Column 6, lines 39-46).

Regarding claim 33, **Boner** further teaches a module comprising:

A) wherein said shift register is a parallel shift register (Column 44-48).

The examiner notes that **Boner** teaches “**wherein said shift register is a parallel shift register**” as “In another embodiment, register file 301 can be implemented using two or more register files working in parallel. In such an embodiment, while a first set of data values is written into one register file, a second set

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of data values is transferred from another register file into RAM 200" (Column 8, lines 44-49).

Regarding claim 34, **Boner** further teaches an integrated circuit device comprising:

A) wherein said sub-controller controls said writing to occur when said shift register is filled (Column 6, lines 39-46).

he examiner notes that **Boner** teaches "**wherein said sub-controller controls said writing to occur when said shift register is filled**" "After register file 301 has been filled, the 4-bit values stored in rows R0, R1, R2 and R3 of register file 301 are transferred to rows R0, R8, R16 and R24, respectively, of RAM 200. This process requires four 4-bit read operations from register file 301 and four 4-bit write operations to RAM 200. The four write operations to RAM 200 are staggered by eight rows, thereby promoting the separation of consecutive data bits within the interleaved data stream" (Column 6, lines 39-46).

Regarding claim 35, **Boner** further teaches an integrated circuit comprising:

A) wherein said shift register is a parallel shift register (Column 44-48).

The examiner notes that **Boner** teaches "**wherein said shift register is a parallel shift register**" as "In another embodiment, register file 301 can be implemented using two or more register files working in parallel. In such an embodiment, while a first set of data values is written into one register file, a second set of data values is transferred from another register file into RAM 200" (Column 8, lines 44-49).

Regarding claim 36, **Boner** further teaches a column interleaver comprising:

A) wherein said module controls said writing to occur when said shift register is filled (Column 6, lines 39-46).

The examiner notes that **Boner** teaches "**wherein said module controls said writing to occur when said shift register is filled**" "After register file 301 has been

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filled, the 4-bit values stored in rows R0, R1, R2 and R3 of register file 301 are transferred to rows R0, R8, R16 and R24, respectively, of RAM 200. This process requires four 4-bit read operations from register file 301 and four 4-bit write operations to RAM 200. The four write operations to RAM 200 are staggered by eight rows, thereby promoting the separation of consecutive data bits within the interleaved data stream" (Column 6, lines 39-46).

Regarding claim 37, **Boner** further teaches a column interleaver comprising:

A) wherein said shift register is a parallel shift register (Column 44-48).

The examiner notes that **Boner** teaches "**wherein said shift register is a parallel shift register**" as "In another embodiment, register file 301 can be implemented using two or more register files working in parallel. In such an embodiment, while a first set of data values is written into one register file, a second set of data values is transferred from another register file into RAM 200" (Column 8, lines 44-49).

7. Claims 25 and 28 are rejected under 35 U.S.C. 103(a) as being unpatentable over **Boner** (U.S. Patent 6,625,763) in view of **Hemming** (U.S. PGPUB 2004/0168011) as applied to claims 16-24, 26-27, 19, and 31-37, and further in view of **Hustig et al.** (U.S. Patent 4,672,605).

8. Regarding claim 25, **Boner** and **Hemming** do not explicitly teach a module comprising:

A) A spread-spectrum communication apparatus

**Hustig**, however teaches "spread-spectrum communication apparatus" as "spread spectrum techniques" (Column 3, lines 38-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Hustig's** would have allowed **Boner's** and **Hemming's** to provide error free communication, as noted by **Hustig** (Column 1, lines 55-57).

Regarding claim 28, **Boner** and **Hemming** do not explicitly teach an integrated circuit device comprising:

A) A spread-spectrum communication apparatus

**Hustig**, however teaches "spread-spectrum communication apparatus" as "spread spectrum techniques" (Column 3, lines 38-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to combine the teachings of the cited references because teaching **Hustig's** would have allowed **Boner's** and **Hemming's** to provide error free communication, as noted by **Hustig** (Column 1, lines 55-57).

#### ***Response to Arguments***

9. Applicant's arguments filed on 12/26/2006 have been fully considered but they are not persuasive.

Applicant argues on page 6 that "**Applicants respectfully submit that neither the Boner patent nor the Hemming publication discloses or suggests inputting a stream of data entities into a shift register; and writing the data entities successively from the shift register into a memory, as recited in claim 16**".

However, the examiner wishes to point to column 8 of **Boner** which states "In another embodiment, register file 301 can be implemented using two or more register files working in parallel. In such an embodiment, while a first set of data values is written into one register file, a second set of data values is transferred from another register file into RAM 200" (Column 8, lines 44-49). The examiner further wishes to state that the specification of the instant application does not explicitly define the functionality of the shift register. Moreover, the examiner wishes to state that the register file of **Boner** broadly teaches the shift register as well as the parallel shift register. Therefore, the examiner wishes to state that the register file of **Boner** anticipates the shift register of the instant application.

#### ***Conclusion***

10. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Patent 6,954,885 issued to **Hurt et al.** on 11 October 2005. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).

U.S. Patent 6,061,820 issued to **Nakakita et al.** on 09 May 2000. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).

U.S. Patent 6,631,491 issued to **Shibutani et al.** on 07 October 2003. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).

U.S. Patent 4,291,406 issued to **Bahl et al.** on 22 September 1981. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).

U.S. Patent 4,394,642 issued to **Currie et al.** on 19 July 2003. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).

U.S. Patent 7,127,004 issued to **Sönning et al.** on 04 October 2006. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).

U.S. Patent 5,022,029 issued to **Guichon** on 04 June 1991. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).

U.S. Patent 6,353,900 issued to **Sindhushayana et al.** on 05 March 2002. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).

U.S. Patent 6,334,197 issued to **Eroz et al.** on 25 December 2001. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).

U.S. Patent 6,035,427 issued to **Kweon** on 07 March 2000. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).



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U.S. Patent 5,719,975 issued to **Wei** on 17 February 1998. The subject matter disclosed therein is pertinent to that of claims 16-29, and 31-37(e.g., methods interleave data).


**Contact Information**


12. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mahesh Dwivedi whose telephone number is (571) 272-2731. The examiner can normally be reached on Monday to Friday 8:20 am – 4:40 pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Tim Vo can be reached (571) 272-3642. The fax number for the organization where this application or proceeding is assigned is (571) 273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

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Patent Examiner  
Art Unit 2168

  
March 23, 2007

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